Greener BMP Use Statistics

LSP Association Training

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Best Management Practices

- BMPs drive environmental footprint reduction
- BMPs are organized on a technology or activity basis, but are applied based on the phase of the project
- BMPs assigned to EPA's five core elements
  - Energy
  - Air Emissions
  - Water Impacts
  - Material and Waste
  - Land and Ecosystem
- Also established 10 Categories

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Green BMP Categories

1. Buildings
2. Materials
3. Power & Fuel
4. Project Planning & Team Management
5. Residual Solid & Liquid Waste
6. Sampling & Analysis
7. Site Preparation/Land Restoration
8. Surface/Storm Water Management
9. Vehicle & Equipment Management
10. Wastewater Management

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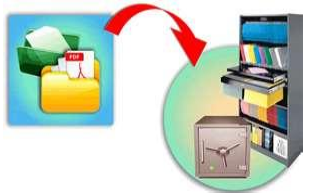
Standard Management Practices *are not* Best Management Practices

- Standard Management Practice (not included because routine)
  - Considered industry standards and are truly basic in nature
    - Recycling office waste
    - Using compact fluorescent light bulbs
    - Minimizing paper use with electronic filing systems

- Best Management Practice
  - Activity that reduces the environmental footprint of a remedy
  - ASTM developed a comprehensive list BMPs



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BMP – Greener Cleanup Table

- Task Group painstakingly compiled table with over 160 BMPs
- Arranged by category, core element and technology
  - 10 Categories (e.g., power & fuel, materials, vehicles…)
  - 5 Core elements
  - 11 Technologies (e.g., SVE, P&T, excavation…)
- User strongly encouraged to add BMPs to the table
- User can sort the Excel table by technology, core element or category

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ASTM BMP Table

		Core Element Addressed (at Site Level)					Remediation Technology										
Category	Best Management Practice	Energy	Air	Water	Materials and Waste	Land and Ecosystems	Soil Vapor Extraction	Air Sparging	Pump and Treat	In-situ Chemical Oxidation	Bioremediation/MNA	In-situ Thermal Treatment	Phytotechnology	Subsurface containment & Treament Barriers	Excavation and Surface Restoration	ex-Situ Bio/chemical oxidation	Vapor Intrusion Mitigation
Buildings	Minimize the size of the housing for above-ground treatment system and equipment	X			X	X	X	X	X	X	X	X	X	X	X	X	X
Buildings	Install energy recovery ventilators in buildings to allow incoming fresh air while capturing energy from outgoing, conditioned air	X					X	X	X	X	X	X	X	X	X	X	X
Buildings	Reuse existing structures for treatment system, storage, sample management, etc.				X		X	X	X	X	X	X	X	X	X	X	X
Buildings	Build energy efficent heating and cooling into new buildings by using natural conditions such as prevailing wind directions for cooling/heating, passive solar building design, and/or existing	X					X	X	X	X	X	X	X	X	X	X	X
Buildings	Design energy efficient HVAC systems (e.g., programmable heating and cooling systems)	X					X	X	X	X	X	X	X	X	X	X	X
Buildings	Properly insulate buildings	X					X	X	X	X	X	X	X	X	X	X	X
Buildings	Build energy efficiency lighting into new buildings by using natural conditions such as passive lighting and by using designed systems such as energy star lighting.	X					X	X	X	X	X	X	X	X	X	X	X
Materials	Use dedicated materials when performing multiple rounds of sampling of all matrices				X		X	X	X	X	X	X	X	X	X	X	X
Materials	Purchase materials in bulk quantities and packed in reusable/recyclable containers and drums to reduce packaging waste				X		X	X	X	X	X	X	X	X	X	X	X
Materials	Use products, packing material, and equipment that can be reused or recycled				X		X	X	X	X	X	X	X	X	X	X	X
Materials	Prepare, store, and distribute documents electronically using an environmental management				X		X	X	X	X	X	X	X	X	X	X	X
Materials	Recycle all non-usable/spent equipment/materials following completion of project				X		X	X	X	X	X	X	X	X	X	X	X
Materials	Use materials that are made from recycled materials (e.g., steel, concrete, plastics and asphalt; tarps made with recycled or biobased contents instead of virgin petroleum-based contents)				X		X	X	X	X	X	X	X	X	X	X	X
Materials	Link a deconstruction project with an on-site or local current construction or renovation project to facilitate reuse of clean salvaged materials.				X		X	X	X	X	X	X	X	X	X	X	X
Materials	Use on-site/local materials, when possible.	X	X		X							X			X		
Materials	Steam-clean or use phosphate-free detergents or biodegradable cleaning products instead of organic solvents or acids to decontaminate sampling equipment			X	X		X	X	X	X	X	X	X	X	X	X	X
Materials	Use wood based materials and products that are certified in accordance with the Forest Stewardship Council (FSC) Principles and Criteria for wood building components				X		X	X	X	X	X	X	X	X	X	X	X
Materials	Use regenerated GAC for use in carbon beds				X		X		X			X					X
Materials	Consider preheating vapors to reduce relative humidity prior to treatment with vapor-phase GAC to improve adsorption efficiency when additional analysis supports approach				X		X					X					X

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Example Selection from BMP Table

Best Management Practice	Core Element Addressed (at Site Level)				
	Energy	Air	Water	Materials and Waste	Land and Ecosystems
Operate system during off-peak hours of electrical demand, without compromising cleanup progress	X				
Use pulsed rather than continuous injections when delivering or extracting air to increase energy efficiency when nearing asymptotic conditions	X				
Use gravity flow where feasible to reduce the number of pumps for water transfer after subsurface extraction	X			X	
Install amp meters to evaluate consumption rates on a real-time basis to evaluate options for off-peak energy usage	X				
Use on-site generated renewable energy (including but not limited to solar photovoltaic, wind turbines, landfill gas, geothermal, and biomass combustion, etc.) to power cleanup activities	X	X			
Use excess plant steam as an energy source to power cleanup activities	X				

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Green BMP Compilation Process

- Identified sites where green BMPs were utilized
  - ASTM reports
  - EPA reports
  - SURF reports
  - Private reports
- Excluded sites with less than 3 BMPs or if greenwashing was suspected
- Inventoried BMPs from 18 sites
- Total of 163 BMPs (Average = 9 BMPs/site)

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Green BMP Compilation Process

- Assigned BMPs to the generic ASTM BMPs (160 different BMPs)
- Compiled master database of all BMPs
- Resulted in a robust database that, like the BMP table, could be sorted
- Sorted database to develop results
  - BMPs used most frequently
  - EPA core elements
  - ASTM categories
- Also, evaluated results based on experience to identify observations about implementing BMPs at cleanup sites

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Top 10 BMPs

# Sites Used	Green BMP
6	Use biodiesel as fuel source
6	Use on-site or nearby sources of fill material
5	Use native species for vegetative cover
5	Reclaim uncontaminated material for reuse, salvage value or recycling
5	Use on-site generated renewable energy (e.g., solar, wind, landfill gas)

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Top 10 BMPs

# Sites Used	Green BMP
5	Incorporate wetlands, bioswales and other natural resources into cleanup
4	Use biodegradable hydraulic fluids in equipment
4	Use local staff to minimize resource consumption
4	Use dedicated materials for sampling
4	Re-vegetate excavated or disturbed areas quickly

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Frequency of Various Categories

Materials	32 BMPs
Site Preparation/Land Restoration	32 BMPs
Power & Fuel	26 BMPs
Project Planning	16 BMPs
Lower Use	
➢ Sampling & Analysis	11 BMPs
➢ Vehicles & Equipment	11 BMPs
➢ Wastewater Management	11 BMPs
Very Low Use	
➢ Residual Solid & Liquid Waste	7 BMPs
➢ Building	6 BMPs
➢ Surface Water/Storm Water Management	4 BMPs

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Frequency of EPA Core Elements Addressed by BMPs

Materials and Waste	101 BMPs
Energy	89 BMPs
Air	66 BMPs
Land and Ecosystem	58 BMPs
Water	52 BPMs

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Observations/Conclusions

- Heavily focused on recycling and reuse
- Also, vegetative issues frequently used
- Appeared to be little quantitative evaluation and, if used, focused on a specific issue (e.g., thermal treatment and energy use in pump & treat)
- Very little greenwashing observed
- Greener cleanups can save money

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Perspective

Industry is now at the point of demonstration

- Including green requirements into RFPs and contracts
- Purchasing green products
- State regulatory requirements – MassDEP is leading the way!
- Focus on the financial element of cost-benefit and ROI
- Need to share lessons learned
  - ASTM Reports
  - SURF Case Studies
  - Articles
  - Presentations

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Helpful Links

- **Sustainable Remediation Forum (SURF)**
  www.sustainableremediation.org
- **CLU-IN (technical resources)**
  www.clu-in.org/greenremediation
- **EPA Greener Cleanup Standard Initiative:**
  www.epa.gov/oswer/greenercleanups/standard.html
- **Sustainable Facilities Tool**
  https://sftool.gov
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